DOCTOR OF PHILOSOPHY IN STATISTICS AND DATA SCIENCE
UNIVERSITY OF HOUSTON

Congruence with System Goals and University Mission

The proposed Ph.D. in Statistics and Data Science aligns with the University of Houston (UH) System Goals and University Mission on student success and community advancement by addressing the growing demand in this field and adding a vital component in the institution's current offerings in degree programs.

With the increasing importance of big data in many scientific disciplines, particularly in biomedical and public health, this program aims to equip students with cutting-edge statistical and data science techniques. By providing the necessary skills and training to analyze and interpret large datasets, it will prepare them for successful careers in various industries and contribute to the advancement of scientific research.

This program will not only benefit students but also the community at large, as graduates will be able to contribute to the socioeconomic development of the greater Houston region. In offering a rigorous doctoral program, UH will establish itself as a leader in statistical and data science. This will enhance the university's national competitiveness, attracting top faculty and students to the institution, and further strengthening its reputation for research.

Program Description

The Ph.D. in Statistics and Data Science program consists of 71 semester credit hours to be completed over five years. It is designed for students who have completed undergraduate or master's level training in statistics or mathematics and are prepared to undertake doctoral research in statistics and data science. The program provides training in statistical theory, data analysis, and computing, with a focus on modern statistical methods for big data. Students will develop expertise in areas such as machine learning, data mining, Bayesian statistics, and statistical computing, and will have the opportunity to apply these skills to real-world situations.

The program emphasizes both theoretical and applied aspects of statistics and data science, with a focus on interdisciplinary collaboration and the development of innovative solutions to complex problems. Graduates of the program will be well-equipped to pursue careers as statisticians, data scientists, or faculty members in academic institutions.

Student and Job Market Demand

There is both short-term and long-term evidence of student demand for a Ph.D. degree program in Statistics and Data Science. According to data from the National Science Foundation (NSF), the number of students receiving a Ph.D. in Statistics increased by 49% from 2018 to 2021. Similarly, students receiving a Ph.D. in the new fields of Data Science and Data Analytics or in Data Mining and Machine Learning increased by 300% from 2021 to 2022. Enrollment in Ph.D. programs in Mathematics and Statistics has also increased by 4% from 2017 to 2021, and the number of students enrolled in Ph.D. programs in data science increased by 10% from 2021 to 2022. The Department of Mathematics receives numerous inquiries from the local Houston community and from students aboard concerning the availability of a Ph.D. degree in Statistics and Data Science.

There is strong evidence that the job market for Ph.D. graduates in statistics and data science is robust. According to the U.S. Bureau of Labor Statistics (BLS), employment of statisticians is

projected to grow 32% from 2022 to 2032, much faster than the average for all occupations. Similarly, projects that the employment of data scientists will grow by 35% from 2022 to 2032. Additionally, there were over 35,000 job openings for mathematicians and statisticians in the United States in 2022 and over 160,000 job openings for data scientists in the same period.

Employers are also willing to pay a premium for workers with advanced degrees in statistics and data science. The National Association of Colleges and Employers states that the median starting salary for Ph.D. graduates in mathematics and statistics was $110,000 in 2023, compared to $84,000 for those with a master's degree and $70,000 for those with a bachelor's degree.

Program Duplication

The proposed Ph.D. program in statistics and data science is unique to the UH system and is not offered by any other UH campus. However, there are a few other institutions in Houston and surrounding regions that offer related programs.

Rice University offers a small Ph.D. program in statistics, which focuses on theoretical and applied statistics. UT Health in Houston offers a Ph.D. program in biostatistics only, which prepares students to apply statistical methods in health-related fields. MD Anderson offers a degree working jointly with UT Health and Rice as a collaborative doctoral program in biostatistics.

Outside of Houston, several universities in Texas offer Ph.D. programs in statistics, including UT Austin, Texas A&M University, UT Dallas, Southern Methodist University, UT San Antonio (Applied Statistics in business school), and Texas Tech University. These programs cover a range of statistical topics and specializations, from theoretical to applied statistics. While there are some similarities between the proposed Ph.D. program at UH and other programs in Texas, the program's focus on data science sets it apart. The proposed program emphasizes the application of statistical methods to real-world problems and provides unique opportunities and experiences for students seeking to specialize in this field.

Faculty Resources

The Department of Mathematics is well-equipped with the faculty and resources to offer a successful doctoral program in Statistics and Data Science. The department currently has six faculty members with Ph.Ds. in statistics, including two tenured Full Professors of Statistics and two tenure track Assistant Professors of Statistics. Additionally, the department has two Instructional Professors of Statistics who are heavily involved in the M.S. in Statistics and Data Science program. The department also has five faculty members with research interests in applied statistics who have all taught graduate level courses in statistics and data science for several years, including Probability, Statistics, Applied Statistics and Multivariate Analysis, Automatic Learning and Data Mining, Deep Learning and Artificial Neural Networks, Mathematics of Machine Learning, Spatial Statistics, and Time-Series Analysis, which provide a comprehensive and well-rounded set of course offerings for a doctoral program in this discipline.

State or National Need

The proposed Ph.D. program in Statistics and Data Science aligns with the state and national need for highly trained professionals in these fields. Houston is a global hub for the Oil and Gas

Industry, which relies heavily on the services of statisticians and data scientists. Conoco Phillips has recognized this need and has provided financial support for the M.S. in Statistics and Data Science program in the Department of Mathematics to train statisticians for its workforce. The Houston Medical Center, one of the largest medical centers in the world, also has a great need for highly trained statisticians and data scientists to interpret medical data and develop efficient algorithms to aid medical research and decision making. The proximity of the medical center further strengthens the need for doctoral level statisticians and data scientists in the region. Texas, particularly the triangle formed by Houston, Austin, and Dallas, is rapidly developing as a high-tech area on a national level, with a clear need for doctoral level statisticians and data scientists to handle the enormous amount of data generated in industries such as energy, health, financial, and manufacturing industries.

PRO FORMA FOR PHD in Statistics and Data Science

FY2027

			Year 0	Operating Years FY2027	FY2028	FY2029	FY2030	FY2031
Enrollments				Fall26	Fall27	Fall28	Fall29	Fall30
Cohort 1				5	5	4	4	4
Cohort 2					5	5	5	4
Cohort 3						5	5	5
Cohort 4							7	6
Cohort 5								8
Cohort 6								
Total				5	10	14	21	27
Expenses								
Faculty (9 month)	Salary	% effort	Year 0	FY2027	FY2028	FY2029	FY2030	FY2031
Mikyoung Jun	199,515	10%		19,952	20,351	20,758	21,173	21,596
Wenjiang Fu	152,599	10%		-	15,260	15,565	15,876	16,194
Yabo Niu	112,090	10%		-	-	11,209	11,433	11,662
Jian Cao	110,000	10%		-	-	-	11,000	11,000
Robert Azencott	197,225	10%		-	-	-	-	19,723
Hyeongseon Jeon	110,000	10%		-	-	-	11,000	11,220
Kresimic Josic	170,733	5%		-	-	-	-	8,537
Demetrio Labate	143,107	5%		7,155	7,298	7,444	7,593	7,745
Matthew Nicol	156,732	5%		-	7,837	7,994	8,154	8,317
Ilya Timofeyev	133,705	5%		6,685	6,819	6,955	7,094	7,236
Position 11				-	-	-	-	-
Position 12				-	-	-	-	-
Position 13				-	-	-	-	-
Position 14				-	-	-	-	-
Position 15				-	-	-	-	-
Adjuncts			-	-	-	-	-	-
Subtotal	1,485,706	80%	-	33,792	57,565	69,925	93,324	123,230
Faculty FTE				0.20	0.35	0.45	0.65	0.80
Staff (12 month)								
Position 1	54,652	50%		27,326	27,872	28,430	28,999	29,579
Position 2				-	-	-	-	-
Position 3				-	-	-	-	-
Position 4				-	-	-	-	-
Position 5				-	-	-	-	-
Position 6				-	-	-	-	-
Graduate Students			-	-	-	-	-	-
Subtotal	54,652	50%	-	27,326	27,872	28,430	28,999	29,579
Staff FTE				0.50	0.50	0.50	0.50	0.50
Total Salaries			-	61,118	85,437	98,355	122,322	152,808
Benefits @ 20.5%			-	12,529	17,515	20,163	25,076	31,326
Total Personnel			-	73,647	102,952	118,518	147,398	184,134
Non-Personnel								
Marketing/Recruiting			2,000	1,000	1,000	1,000	1,000	1,000
Scholarships & Tuition Assistantships			-	-	-	-	-	-
Annual maintenance & operations			7,500	7,500	7,500	7,500	7,500	7,500
Library and Information Technology					-	-	-	-
Accreditation					-	-	-	-
Facilities					-	-	-	-
Laboratory and other equipment					-	-	-	-
Other			-	-	-	-	-	-
Total Non-Personnel			9,500	8,500	8,500	8,500	8,500	8,500
Allocated to university operations		10%		2,258	11,922	13,729	32,814	35,523
Total Annual Expense			$ 9,500	$ 84,405	$ 123,374	$ 140,747	$ 188,712	$ 228,157
Revenue								
Formula Funding Generated				-	77,064	77,064	242,751	242,751
Statutory Tuition Applied to Formula				-	(3,000)	(3,000)	(9,450)	(9,450)
Subtotal: State General Revenue				-	74,064	74,064	233,301	233,301
UH Tuition and Fees				23,547	47,094	65,932	98,897	127,154
Allocated to set aside per student				(967)	(1,935)	(2,709)	(4,063)	(5,224)
Total Revenue from Enrollment				22,580	119,223	137,287	328,136	355,231
Philanthropy and other External Revenue				-	-	-	-	-
Net Revenue				22,580	119,223	137,287	328,136	355,231
Net Annual Gain/(Loss)			**(9,500)**	**$ (61,826)**	**$ (4,151)**	**$ (3,460)**	**$ 139,424**	**$ 127,074**
Cumulative Gain/(Loss)			(9,500)	**$ (71,326)**	**$ (75,477)**	**$ (78,936)**	**$ 60,488**	**$ 187,562**

College Business Administrator Signature: _____ Date: _____

Daniel Chang, Program Director, Office of the Provost Signature: _____ Date: _____

Vivianne Do, Executive Director, Office of the Provost Signature: _____ Date: _____